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SCIENCE RESOURCES STUDIES HIGHLIGHTS

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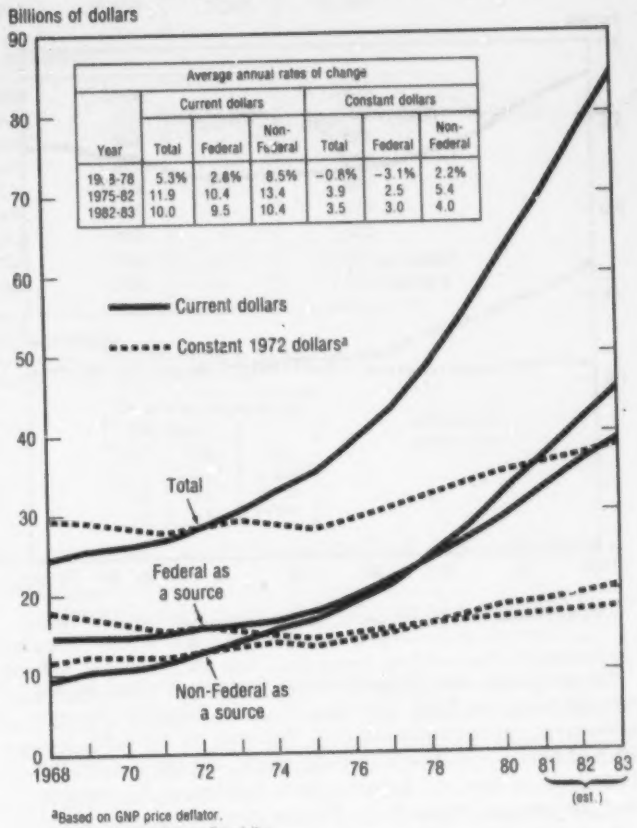
National R&D Expenditures Expected to Reach $85 Billion in 1983

Highlights

- Total expenditures for research and development in the United States are expected to amount to an estimated $85 billion in 1983, 10 percent more than in 1982. Using the Office of Management and Budget's 6-percent estimate of inflation for 1983,[1] the increase in R&D spending in constant dollars is estimated at 4 percent. National R&D expenditures have increased in real terms each year between 1975 and 1983 at an average of 4 percent annually[2] (chart 1). Prime factors in this growth were the Federal R&D increases in defense, space, and energy areas as well as general industrial R&D growth.
- Based on the proposed 1983 budget, Federal R&D expenditures in 1983 are expected to increase 9 percent over 1982 levels to $39.6 billion, or 3 percent in real terms. Defense, which currently accounts for more than 50 percent of the Federal R&D total, is expected to increase nearly 15 percent in real terms in 1983, following a 10-percent increase in 1982. The National Aeronautics and Space Administration is also expected to show a real-term increase (6 percent) between 1982 and 1983. The combined R&D expenditures of all other Federal agencies are likely to record a drop of nearly 15 percent in real terms between the 2 years.
- During the midsixties the Federal Government supported nearly two-thirds of the Nation's R&D effort. By 1978 the Federal share had dropped to just under one-half. In 1983 Federal R&D support is expected to remain at less than one-half of the national total, although large increases are expected in defense and space areas. Non-Federal support is expected to increase slightly faster than overall Federal support in 1983.
- Industry provides almost 95 percent of non-Federal R&D support with increases in industry R&D spending focusing on energy. In 1983 industry R&D support is expected to amount to $42.6 billion, 11 percent more than the amount estimated for 1982. In real terms, industry R&D spending should increase 4 percent between the 2 years.
- National R&D expenditures as a percent of the gross national product (GNP) have been increasing slightly each year between 1977 and 1982. Over this period the national R&D/GNP ratio increased from 2.2 percent to 2.4 percent, compared with a peak of 3.0 percent in 1964. In 1983, the ratio is expected to remain at 2.4 percent.
- When the U.S. R&D/GNP ratio is compared to those in other major industrialized nations, the U.S. ratio is roughly comparable to that in West Germany, the United Kingdom, and Japan. For civilian (nondefense and nonspace) activities only, however, the U.S. ratio is lower (1.6 percent of total GNP) than that of West Germany (2.2 percent) and Japan (1.9 percent).

Chart 1. National R&D expenditures



[a]Based on GNP price deflator.
SOURCE: National Science Foundation

[1]Annual change in the implicit price deflator for the GNP.
[2]Average annual percent changes have been computed using compound rates of change.

Prepared in the R&D Economic Studies Section, Division of Science Resources Studies.

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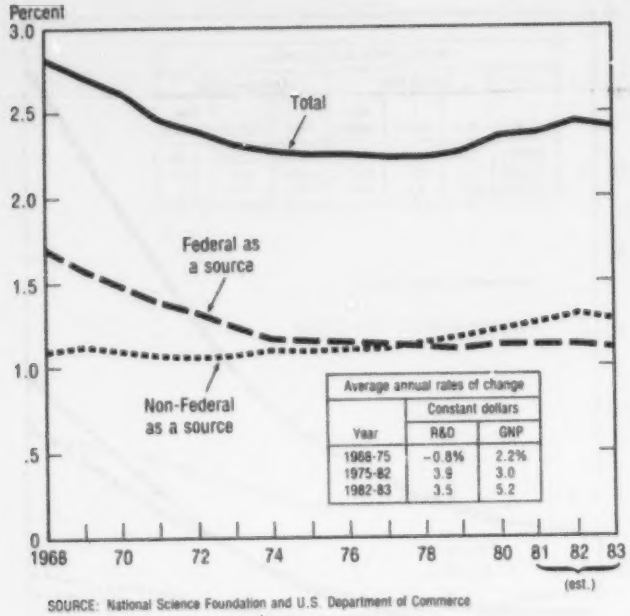
R&D/GNP

Chart 2 shows that U.S. R&D expenditures as a percent of GNP are expected to remain at 2.4 percent during 1983, the same ratio as in the previous 3 years. The R&D/GNP ratio reached a high of 3.0 percent in 1964 before declining steadily to 2.3 percent in 1973, reflecting a slowdown in the growth of Federal R&D programs over this period. The ratio then stabilized over the next 5 years, primarily as a result of increases in both Federal and non-Federal R&D efforts in the energy area. The increase from 2.2 percent in 1978 to 2.4 percent in 1980 reflected a real-term leveling of the Nation's GNP over this period. Given a reversal in economic conditions in 1982, the ratio is expected to remain at 2.4 percent in 1983.

Chart 2. R&D/GNP



SOURCE: National Science Foundation and U.S. Department of Commerce

International comparisons show that the United States spends more on R&D activities than all Western Europe countries and Japan combined. Relative to the GNP, the United States and West Germany spend the same, with the United Kingdom and Japan closely behind at 2.1 percent and 2.0 percent, respectively. France currently spends about 1.8 percent of its GNP on R&D activities. When civilian (nondefense and nonspace) activities are compared to the GNP, a lower ratio exists in the United States than in some of the larger Western economies—1.6 percent in the United States versus 2.2 percent in West Germany and 1.9 percent in Japan.

Basic Research, Applied Research, and Development

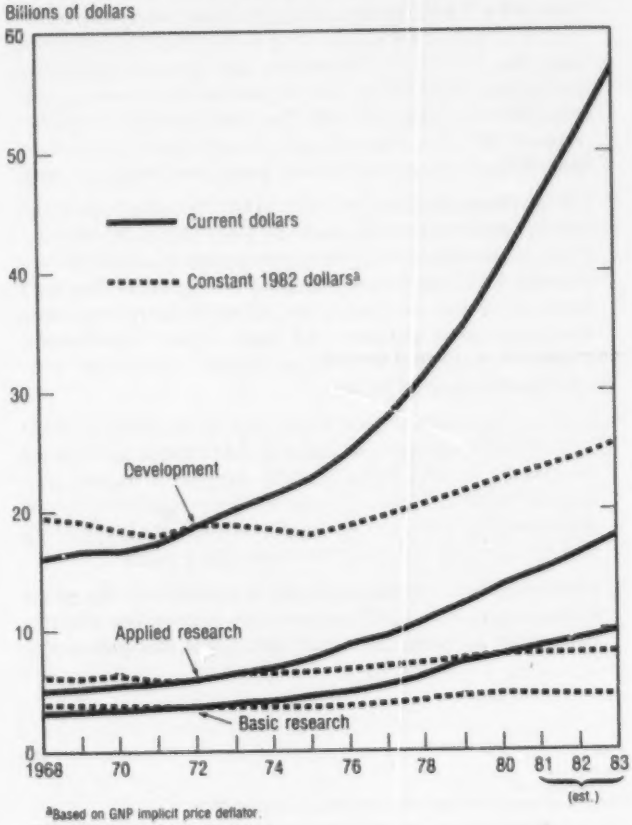
Total research expenditures (basic and applied) are expected to reach $28 billion in 1983, 8 percent more than in 1982. Development spending is expected to reach $57 billion, 11 percent more than in the previous year.

Of the research total, basic research expenditures in 1983 should approach $10 billion, 7 percent more than in 1982. Applied research is expected to increase by about 9 percent between the 2 years to more than $18 billion (chart 3). After increasing each year in real terms since 1975, both basic and applied research have remained relatively level since 1981, reflecting Federal cutbacks in both areas as the Government shifted toward greater defense activities. The growth in defense has had its primary effect on development expenditures which have increased 4 percent annually in real terms since 1981.

Each year since the late sixties universities and colleges have performed about one-half the Nation's basic research. Currently, the Federal Government provides 70 percent of total university and college expenditures. In large part, university basic research efforts have emphasized programs in the life sciences, with most of this funding coming from the Department of Health and Human Services. Industry, the second largest basic research performer with nearly 20 percent of the national total, has emphasized programs dealing with energy conservation and supply.

In the areas of applied research and development, industry is the largest performer with 60 percent and 85 percent, respectively, of the national totals. These ratios have remained fairly constant since data were first collected in 1953. The bulk of industry performance in both areas is provided by companies' own funds with wide variations among industries. Industry's applied research and development spending has emphasized energy programs and, in recent years, defense activities.

Chart 3. National basic research, applied research, and development expenditures



[a]Based on GNP implicit price deflator.
SOURCE: National Science Foundation

Funds for research and development
[Millions of dollars]

Year	Total	Federal Government	Industry[1]	Academic sector		Other nonprofit institutions[2]
				Universities and colleges	Associated FFRDC'S[1]	
	By performer					
1975	$35,213	$5,354	$24,187	$3,409	$ 987	$1,276
1976	39,016	5,769	26,997	3,727	1,147	1,376
1977	42,982	6,105	29,928	4,070	1,384	1,495
1978	48,295	6,920	33,365	4,621	1,717	1,672
1979	54,994	7,564	38,147	5,354	1,935	1,994
1980	62,222	7,929	43,879	6,049	2,235	2,130
1981 (est.)	69,790	9,000	49,600	6,600	2,350	2,240
1982 (est.)	77,285	10,000	55,700	6,950	2,350	2,285
1983 (est.)	85,000	11,000	61,800	7,500	2,300	2,400
	By source					
1975	$35,213	$18,109	$15,820	$749	—	$535
1976	39,016	19,914	17,694	808	—	600
1977	42,982	21,727	19,696	887	—	672
1978	48,295	24,003	22,491	1,035	—	766
1979	54,994	26,935	26,028	1,194	—	837
1980	62,222	29,576	30,400	1,313	—	933
1981 (est.)	69,790	32,910	34,385	1,490	—	1,005
1982 (est.)	77,285	36,125	38,500	1,600	—	1,060
1983 (est.)	85,000	39,550	42,600	1,700	—	1,150

[1]FFRDC's administered by individual universities and colleges and by university consortia.
[2]Includes expenditures for federally funded research and development centers (FFRDC's) administered by this sector. They account for less than 5 percent and 15 percent, respectively, of the industry and nonprofit performance totals.

SOURCE: National Science Foundation

R&D Support

The national support for research and development is expected to reach an estimated $77.3 billion in 1982. In 1983 this level is expected to increase 10-percent—4 percent in constant dollars—to $85 billion. R&D expenditures have been increasing in constant dollars each year since 1975, averaging 4 percent per year through 1983, following a 10-year period of no real growth.

The Federal Government is expected to provide nearly $40 billion in R&D support during 1983, about 10 percent more than in 1982. In constant dollars, Federal R&D spending has increased each year since 1975, averaging nearly 3 percent per year through 1983. In the first 5 years of this period, Government R&D investment reflected the growing national emphasis on energy conservation and development. In 1981 the R&D efforts of the Government began to shift toward defense activities. Based on the 1983 budget, defense programs will continue to stimulate R&D increases.

Non-Federal R&D support is expected to exceed $45 billion in 1983, 10 percent more than in 1982, or 4 percent more in real terms. This projected real growth is slightly higher than that shown for the previous 2 years, reflecting the anticipated end of the current recession which began in mid-1981, as well as an expected 1983 decrease in the inflation rate. From 1975 to 1983 non-Federal R&D support is expected to increase at an average annual rate of more than 5 percent—nearly twice the rate of Federal R&D support.

Almost 95 percent of non-Federal support is provided by industry where R&D spending is expected to increase 11 percent between 1982 and 1983, based on comments received from industrial R&D executives. The constant-dollar growth in industry spending on research and development since 1975 reflects to a large extent increases in energy and environment-related programs. Industry-performed R&D activities account for about 70 percent of the U.S. total each year—an expected $62 billion in 1982. In the late sixties, the Government provided nearly one-half the funds for research and development performed by industry. From the mid-seventies through 1983, however, industry's own funds account for approximately two-thirds of its R&D effort. The drop in Government R&D funds to industry was due mainly to cutbacks in Federal defense and space programs during the late sixties to midseventies. The expansion in defense R&D spending since 1981 indicates that this trend may be reversed.

Comments from industrial R&D officials indicate the 1981 tax law changes are expected to have a positive impact on future industry R&D spending. Although companies have not as yet fully assessed the impact of this legislation, it is expected to create a generally favorable business environment beneficial to research and development.

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